UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/948,375	10/09/97	ZWEBEN	M PEO-001-C1

LM02/0804

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EXAMINER
POINVIL,F

ART UNIT	PAPER NUMBER
2761	19

DATE MAILED:
08/04/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

	Application No.	Applicant(s)	
	08/948,375	Zweben et al.	
	Examiner	Group Art Unit	
	Frantzy Poinvil	2761	

☒ Responsive to communication(s) filed on *Oct 9, 1997* _____ .

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire _____*3*_____ month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-20* _____ is/are pending in the application.

    Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-20* _____ is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

    ☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

        ☐ received.

        ☐ received in Application No. (Series Code/Serial Number) _____ .

        ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    *Certified copies not received: _____ .

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *5*

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Claim Rejections - 35 USC § 101

1.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2.   Claims 1-11 and 20 are rejected under 35 U.S.C. 101 because they are directed toward non-statutory subject matter.

As per claims 1-11, the Examiner notes that the disclosed invention is within the technological arts because there is a computer involved or described to perform the claimed functions as noted throughout applicant's specification. The claimed invention of claims 1-11 are also noted not to be a computer program, data structure, or a natural phenomenon. The claimed invention includes a series of steps not to be performed by a general purpose computer. The claimed invention also does not include a post-computer process activity or a pre-computer process activity. No physical transformation is performed, no practical application is found. Consequently, the claims are analyzed based upon the underlying process, and are thus rejected as being directed to a non-statutory process.

As per claim 20, data Structures not claimed as embodied in computer-readable media are

descriptive material per se and are not statutory because they are neither physical "things" nor

statutory processes. Such claimed data structures do not define any structural and functional

interrelationships between the data structure and other claimed aspects of the invention which

permit the data structure's functionality to be realized. In contrast, a claimed computer-readable

medium encoded with a data structure defines structural and functional interrelationships between

the data structure and the medium which permit the data structure's functionality to be realized,

and is statutory. Thus, claim 20 is rejected as being non-statutory as described above.

3.   *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

Claims 1-20 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Syswerda

considered with Tanaka.

Regarding claim 1, Syswerda teaches a method for scheduling an activity(See Syswerda,

Abstract) that uses consumable resources (see Syswerda column 4, lines 12-19) and is governed

by a set of predefined constraints (See Syswerda, abstract and column 1, line 68 to column 2, line

4). An initial schedule is create through the random assignment of task (see Syswerda at column 2, lines 42-45). Through the use of crossover and mutation operators new schedules are generated (see Syswerda, column 4, lines 59-63). Legal schedules are created that meet all hard constraints and scoring is accomplished using weighted values for soft constraints (see Syswerda at column 2, lines 26-28). Schedules that are scored highly have a higher likelihood of being chosen for participation in the operation than a relatively low scoring schedule. However, random selection is also used to ensure complete evaluation of the decision space (See Syswerda at column 4, line 68 to column 5, line 5). The process is repeated and a listing of ranked schedules is generated from highest to lowest (see claim 1 of Syswerda).

Syswerda does not teach of repairing constraint violations. All hard constraints are strictly meet to generate legal schedules. The evaluation of the soft constraints and whether they are violated along with their associated weights are used to establish scores for each schedule.

Tanaka teaches of selectively relaxing violated constraints in order to generate a legal schedule (see abstract of Tanaka). The Examiner respectfully asserts that constraint relaxation is one method of constraint violation repair which would fall within the boundaries of the claims as presently drafted.

The motivation to modify the teachings of the primary reference Syswerda with that of the secondary reference, Tanaka comes directly from the secondary reference. In the real world of manufacturing, not all constraints need to always be strictly satisfied. In a production scheduling problem, and on a factory floor, machine usage is normally flexible to some extent and can be

changed more or less depending on conditions. In this manner, in an actual constraint satisfaction problem, constraints can be relaxed to widen a "solution space" or "a set of candidate solutions". In this manner, the probability of finding an optimal production schedule is increased and the commensurate savings due to increased efficiently is realized.

As per claim 2, Syswerda teaches that schedules which are scored highly have a higher likelihood of being chosen for participation in the operation than a relatively low scoring schedule (see Syswerda at column 4, line 68 to column 5, line 5).

As per claim 3, schedules which score highly have a better chance of making the list. However, random selection is also used to ensure complete evaluation of the decision space (See Syswerda at column 4, line 68 to column 5, line 5). The Examiner asserts that this would cause the worst scoring schedule to occasionally be selected for list inclusion.

As per claim 4, Syswerda does not per se select the last schedule as the final schedule which in the present application would be the highest scored schedule. However, Syswerda does supply an ordered list of schedules in ranked order. It would have been obvious to one of ordinary skill in the art to select the highest ranked schedule as the final schedule. Otherwise, a less than optimum schedule would be used to produce a product.

As per claims 5 and 13, Syswerda does not teach storing the best scoring schedule or the list of ranked schedules. The examiner asserts that it is well known in the art to store the computations. The motivation to do so is to allow for later retrieval and review.

As per claim 6, Syswerda teaches that tasks and their associated constraints are given different priorities. When a task is placed into the schedule but it has a soft constraint violation then only half of its priority is added to the schedules score (see column 4, lines 34-49 of Syswerda). The degree of violation of the constraint is not addressed by Syswerda. However, Tanaka teaches that constraints may be relaxed to enable the creation of a legal schedule. To accomplish this, Tanaka uses a knowledge base to determine the possibility and degree of relaxation possible (see column 3, lines 1-6 of Tanaka). The motivation to modify the primary reference with the teachings of the secondary reference has been previously supplied under claim 1 and is incorporated here by reference.

As per claim 7, Syswerda teaches that tasks and their associated constraints are given different priorities. When a task is placed into the schedule but it has a soft constraint violation then only half of its priority is added to the schedules score (see column 4, lines 34-49 of Syswerda). The degree of violation of the constraint is not addressed by Syswerda. However, Tanaka teaches that constraints may be relaxed to enable the creation of a legal schedule. To accomplish this, Tanaka uses a knowledge base to determine the degree of relaxation possible (See column 3, lines 1-6 of Tanaka). The motivation to modify the primary reference with the teachings of the secondary reference has been previously supplied under claim 1 and is incorporated here by reference.

Regarding claim 8, Syswerda does not teach of repairing constraint violations. Tanaka teaches of selectively relaxing violated constraints in order to generate a legal schedule (See the

abstract of Tanaka). The Examiner respectfully asserts that constraint relaxation is one method of

constraint violation repair which would fall within the boundaries of the claims as presently

drafted. After relaxation under the Tanaka invention the constraint violation would be less severe

since there would probably be no constraint violation.

The applicant is directed to claim 1 for the motivation to modify the teachings of the

primary with the teaching of the secondary reference.

Regarding claim 9, neither Syswerda nor Tanaka teaches of requiring a schedule to

surpass a predetermined threshold score. However, Syswerda supplies a ranked listing of scored

schedules and the Examiner asserts that the user that the user may select any schedule form the

list which exceeds a threshold score.

Regarding claims 10, 11, 17 and 18, neither Syswerda nor Tanaka teach that resources are

inventory or materials used in maintenance and repair operations. However, Syswerda teaches

that resources may be selected from a predetermined pool of resources (See column 4, lines 12-19

of Syswerda). The Examiner asserts that inventory and parts used for maintenance and repair are

resource which can be retrieved from a pool of resources (See column 1, lines 62-66 of

Syswerda).

As per claim 12, Syswerda teaches of a method for scheduling an activity (See the abstract

of Syswerda) that is governed by a set of predetermined constraints (See abstract and column 1,

line 68 to column 2, line 4). An initial schedule is created through the random assignment of tasks

(see column 2, lines 39-40 of Syswerda). The schedule is then evaluated and scored in order to

obtain a ranking (See column 2, lines 42-45 of Syswerda). All constraints have descriptive

information stored identifying them as either soft or hard constraints (See column 2, lines 23-29 of

Syswerda). Through the use of crossover and mutation operators new schedules are generated

(See column 4, lies 59-63). Legal schedules are created that meet all hard constraints and scoring

are accomplished using weighted values for soft constraints (See column 2, lines 23-29 of

Syswerda). Schedules that are scored highly have a higher likelihood of being chosen for

participation in the operation than a relatively low scoring schedule. However, random selection

is also used to ensure complete evaluation of the decision space (See column 4, line 68 to column

5, line 5 of Syswerda). The process is repeated and a listing of ranked schedules is generated

from highest to lowest (See claim 1 of Syswerda).

Syswerda does not teach of repairing constraint violation and thereby generating new

schedules for comparison to earlier generated schedules scores.

Tanaka teaches of selectively relaxing violated constraints in order to generate a legal (See

the abstract of Tanaka). The Examiner respectively asserts that constraint relaxation is one

method of constraint violation repair which would fall within the boundaries of the claims as

presently drafted.

The applicant is directed to claim 1 for the motivation for modifying the teachings of the

primary reference with that of the secondary reference.

As per claim 14, all constraints have descriptive information stored identifying them as

either soft or hard constraints (See column 2, lines 23-29 of Syswerda). Tasks and their

associated constraints are weighted through a priority function (See column 4, lines 1-5 of Syswerda). Syswerda does not teach of providing descriptions of constraints or repairing constraints using a method specific to the constraint.

Tanaka teaches that each constraint has an associated knowledge source which indicates whether the constraints may be relaxed and the degree and the degree by which it is relaxed. In addition, which such information in absent then the system may turn to an external source (See column 3, lines 1-12 of Tanaka). The Examiner asserts that it would have been necessary to identify in a descriptive manner the constraint to the external source for the external source to be able to supply information on relaxing the constraint.

The applicant is directed to claim 1 for the motivation for modifying the teachings of the primary reference with that of the secondary reference.

As per claims 15 and 16, the Examiner asserts that the use of an input device and display are well known in the art.

As per claim 19, Syswerda teaches that hard and soft constraints may include reusable resource constraints (see column 4, lines 25-28 of Syswerda).

Claim 20 is similar to claim 1 and the applicant is directed to claim 1 for the reasoning behind the rejection of the claim.

4.   **Response to Applicant's Remarks:**

the applicant has traversed the first office action in this case on two fundamental grounds. First as asserted on page 9 in the applicant's response received February 6, 1997, neither

Syswerda nor Tanaka teaches scheduling a task that uses consumable resources. Second, as

asserted on page 12 in the applicant's response. Tanaka teaches constraint relaxation which is not

the same as constraint repair as claimed. The Examiner respectfully disagrees on both issues.

Regarding the first issue both Syswerda and Tanaka are scheduling systems used in factory

environments. Both systems allocate resources to tasks. In a factory, both reusable and

consumable resources are applied to tasks in order to create a product. Syswerda specifically

discusses the allocation of resources to tasks (see column 4, lines 12-19 of Syswerda). The

applicant asserts that Syswerda only deals with reusable resources and cites column 4, lines 26-28

as support. However, the passage cited was an example of what is referred to by Syswerda as a

hard constraint violation. Namely, a single task could only use a single given resource at any

given time and any violation would be considered a violation of a hard constraint not permitted.

The Syswerda invention teaches the use of both hard and soft constraints with the distinction

being that hard constraints may not be violated and soft constraints may be. Otherwise, the user

may specify anything as being a hard or soft constraint and the Examiner asserts that this includes

both reusable and consumable. As an example, the user of the Syswerda system may specify that

inventory may not drop below a certain point and that this can be designated either a hard

constraint or a soft constraint by the user. For example, if inventory may be easily and quickly

replenished then this may be a soft constraint and relaxing the constraint the constraint using the

Tanaka invention would be possible. On the other hand, if lead time for a part is long, then this

could be designated a hard constraint.

Regarding the assertion that Tanaka does not teach the use of consumable resources, the

applicant supplies and example (page 9 of the response) of power consumption used by the

factory as reusable resource. The Examiner asserts that power is generally considered a

consumable resource which may be replenished like any consumable resource.

Regarding the applicant's second issue (page 12 of the response), the applicant argues that

the constraint relaxation method of Tanaka is not the same as the constraint repair method as

claimed. When examining the claims, the Examiner is required to give the claims "the broadest

reasonable interpretation consistent with the specification." In re Prater, 1396, 415 F.D. 1393,

1405, 162 USPQ 541, 551 (1969). In the instant case, the claims call for repairing constraint

violations. As stated by the applicant on page 12 of the response, constraint repair "generally"

does not widen a solution space as constraint relaxation does. However, as the statement implies,

on occasion, a constraint violation may be repaired by constraint relaxation. Therefore, giving the

claims the broadest reasonable interpretation, constraint violations may be repaired by constraint

relaxation and the claims as presently drafted read upon Tanaka.

Based on the above analysis the Examiner finds the applicant's arguments to be

unpersuasive.

5.

Conclusion

Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Frantzy Poinvil, whose telephone number is (703)

Art Unit: 2761

305-9779. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM.

The fax phone number for this Art Unit is (703) 305-0040.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

FP
29Jul99

Frantzy Poinvil
Primary Examiner
Art Unit 2761